REMARKS

Claims 21-37 are pending in the present application.

In the office action mailed December 15, 2005 (the "Office Action"), the Examiner withdrew the allowability of claims 21-37 and rejected claims 21, 28, 33-37 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,794,703 to Thakur *et al.* (the "Thakur patent"). The Thakur patent was cited by Applicants in a supplemental information disclosure statement submitted June 14, 2005. The Examiner further rejected claims 22-27 and 29-32 under 35 U.S.C. 103(a) as being unpatentable over the Thakur patent.

Claim 28 has been amended to correct a typographical error. More specifically, reference to "the undoped silicone layer" in line 10 has been amended to recite "the undoped silicon layer." The amendment does not substantively change the subject matter of claim 28, but merely corrects an error, which is apparent from the recitation of an "undoped silicon layer" throughout claim 28. It will be appreciated that the amendments were made independent of the cited references and that none of previously mentioned amendments narrow or further limit the scope of the invention as recited by claim 28. Consequently, the amendment should not be construed as being a "narrowing amendment," because the amendment was not made for a substantial reason related to patentability.

Claims 21, 28, and 33 are patentably distinct from the Thakur patent because the Thakur patent fails to disclose the combination of limitations recited by the respective claims. For example, with respect to claim 21, the Thakur patent fails to disclose forming an undoped silicon layer that overlies a silicon-germanium alloy layer, seeding the undoped silicon layer to cluster atoms and thereby form nuclei on a surface of the undoped silicon layer, and annealing the semiconductor structure to grow the nuclei into hemispherical protrusions. The Thakur patent generally describes using relatively high pressure to treat the surface of a bottom plate electrode 104 and densify a high-dielectric constant ("HDC") dielectric capacitive film 102. The use of a relatively high pressure enables the use of lower processing temperatures, and consequently, conserves thermal budget during the fabrication process. *See* col. 11, lines 23-29. Another embodiment where a metallic material is used for a bottom plate electrode 204, the relatively high pressure treatment is used only for the densification of the HDC film 202. *See* col. 11, lines 36-40 and col. 13, lines 42-46.

The Examiner has cited material at col. 8, lines 59-65, col. 9, lines 10-52, and shown in Figures 1A-1D, as disclosing the combination of limitations recited in claim 21. The cited material in column 8 describes the formation of a thin diffusion barrier 122 over the bottom plate electrode 104. Examples of the materials that can be used for the diffusion barrier 122 are silicon-nitride, silicon-oxide, germanium-oxide, and germanium-nitride. The cited material at column 9 describes various HDC films that can be used for the capacitive dielectric film 102 that is formed over the diffusion barrier 122. The cited material further discusses the conventional manner in which to form the HDC layer, such as using CVD, LPCVD, PECVD, and RTCVD.

None of the cited material in the Thakur patent discloses forming an undoped silicon layer overlying a silicon-germanium allow layer. As previously discussed, the material cited by the Examiner discusses the formation of a diffusion barrier layer 122 and the formation of a capacitive dielectric film 102 over the bottom plate electrode 104. The materials suggested for the diffusion barrier layer 122 and the capacitive dielectric HDC film 102 are not analogous to an undoped silicon material. The materials disclosed in the Thakur patent are generally dielectric in nature. Thus, the formation of either the diffusion barrier layer 122 or the capacitive dielectric film 102 does not anticipate the formation of an undoped silicon layer, as recited in claim 21. Moreover, the Thakur patent does not describe seeding the undoped silicon layer and annealing the same. The Thakur patent discloses the use of HSG polysilicon or silicon-germanium for the bottom plate electrode 104. *See e.g.*, col. 8, lines 1-5. However, the particular process of forming HSG from an undoped silicon layer that has been seeded and annealed is not disclosed. As illustrated in Figures 1D-1F of the Thakur patent, the roughened HSG surface is not formed from a layer that is distinguishable from the bottom electrode 104. That is, as illustrated in Figures 1D-1F the roughened HSG surface disclosed in the Thakur patent is not formed from an undoped silicon layer that is formed over a silicon-germanium allow layer which is then seeded and annealed, as recited in claim 21.

Claims 28 and 33 also recite limitations that are disclosed in the Thakur patent. For example, with respect to claim 28, the Thakur patent does not disclose forming a silicon-germanium alloy layer on a surface of the container and on a surface of the BPSG layer, forming an undoped silicon layer that overlies the silicon-germanium alloy layer, removing the portions of the silicon-germanium alloy and undoped silicon layer that are lying on a surface of the BPSG layer, removing a portion of the BPSG to expose an outer surface of the silicon-germanium alloy

layer, and forming hemispherical protrusions on a surface of the undoped silicon layer. With respect to claim 33, the Thakur patent fails to disclose forming a container in a layer of borophosphorus silicate glass (BPSG), forming a silicon-germanium alloy layer on a surface of the container, the silicon-germanium alloy having an outer surface abutting the BPSG layer and having an inner surface, removing portions of the silicon-germanium alloy overlying a surface of the BPSG layer, removing portions of the BPSG layer to expose at least a portion of the outer surface of the silicon-germanium layer, depositing an undoped silicon layer over the inner surface and exposed outer surface of the silicon-germanium alloy layer, and converting the undoped silicon layer into hemispherical protrusions.

As previously discussed with respect to claim 21, the Thakur patent fails to disclose any particular technique for forming HSG or a roughened surface, and does not disclose techniques for forming the various memory cell structures illustrated by the Figures 1A-1F and 2A-2D. The Thakur patent focuses on providing various relatively high-pressure and temperature conditions for the formation of the bottom plate electrode, the capacitive dielectric HDC film 102 independent of any particular memory capacitor configuration. *See* col. 7, lines 58-61. This is consistent with the purpose of the invention, which is to provide a process for forming a HDC dielectric for a memory cell that is resistant to leakage, but also conserves the thermal budget during device fabrication. Claims 28 and 33 include limitations that are directed to the process of forming particular structures, such as, "forming a container in a layer of borophosphorus silicate glass" and "removing the portions of the silicon-germanium alloy and undoped silicon layer that are lying on a surface of the BPSG layer," which are not disclosed by the Thakur patent.

For the foregoing reasons, claims 21, 28, and 33 are patentably distinct from the Thakur patent. Claims 34-37, which depend form claim 33 are similarly patentably distinct from the Thakur patent based on their dependency from an allowable base claim. Therefore, the rejection of claims 21, 28, and 33-37 under 35 U.S.C. 102(e) should be withdrawn.

As previously discussed, claims 22-27 and 29-32 have been rejected under 35 U.S.C. 103(a) as being unpatentably over the Thakur reference.

The Examiner's rejection of claims 22-27 and 29-32 should be withdrawn for several reasons. First, claims 22-27 which depend from claim 21, and claims 29-32, which depend from claim 28, are patentable based on their dependency from respective allowable base

claims. Second, in rejecting claims 22-27 and 29-32, the Examiner acknowledges that the Thakur patent does not teach or suggest "the specific annealing temperatures, duration time and chemical mechanical planarizing." *See* the Office Action at page 5. However, the Examiner dismisses the various limitations by stating "the specific annealing temperatures, duration time and chemical mechanical planarizing are considered obvious." *See id.* As set forth in the Manual of Examining Procedure at section 2144.03, taking official notice or reliance on "common knowledge" should be judiciously applied. As further set forth at 2144.03, it is not appropriate for the examiner to take official notice of facts without citing a prior art reference where the facts asserted to be well known are not capable of instant and unquestionable demonstration as being well-known.

The Examiner's reliance on the obviousness of the annealing temperatures and processing times cannot be instantly and unquestionably demonstrated, and consequently, requires citation of prior art references. The "un-obviousness" of semiconductor processing conditions, such as temperature and time, is acknowledged in the Thakur patent relied upon by the Examiner for the anticipation arguments. As described in the Thakur reference, temperature conditions during processing and the time a device is subjected to the various temperatures can significantly degrade the performance of the fabricated device. *See* col. 2, lines 32-46. Yet the Examiner dismisses the importance of the particular processing conditions recited in the claims as being obvious, although even the primary reference is directed to providing specific processing conditions that are advantageous over the prior art. If the Examiner maintains the rejection of claims 22-27 and 29-32 under 35 U.S.C. 103(a) based on the Thakur patent and common knowledge in the art, Applicants request the citation of references supporting the Examiner's position of common knowledge.

Another reason the rejection of claims 22-27 and 29-32 under 35 U.S.C. 103(a) cannot be maintained is because the Thakur patent, which as will be explained in more detail below, is not considered prior art in view of 35 U.S.C. 103(c). 35 U.S.C. 103(c) states:

> "(c)(1) Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under [section 103] where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person."

The Thakur patent has been cited by the Examiner as a 35 U.S.C. 102(e) reference, as previously discussed. With respect to common ownership, both the Thakur patent and the present application were, at the time the invention was made, owned by, or subject to an obligation of assignment to, the same person, namely, Micron Technology, Inc. The cover page of the Thakur patent indicates that the Assignee is Micron Technology, Inc., and the assignment of the present application to the same entity is recorded at Reel/Frame number 012226/0547 on September 26, 2001. Therefore, under 35 U.S.C. 103(c), the Thakur patent cannot be relied upon as prior art for the rejection of claims 22-27 and 29-32 under 35 U.S.C. 103(a).

For the foregoing reasons, claims 22-27 and 29-32 are patentable over the Thakur patent, and consequently, the rejection of claims 22-27 and 29-32 under 35 U.S.C. 103(a) should be withdrawn.

All of the claims pending in the present application are in condition for allowance. Favorable consideration and a timely Notice of Allowance are earnestly solicited.

Respectfully submitted,

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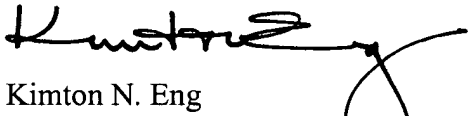

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